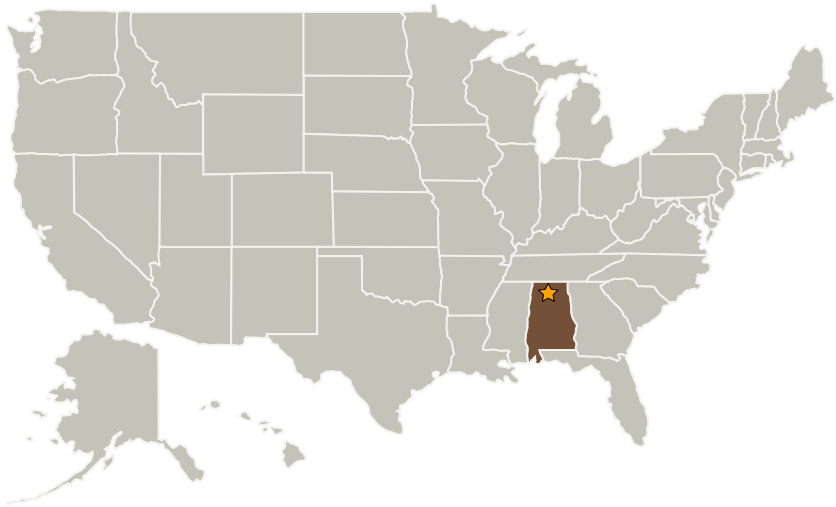
Modular Self-Rigidizing Lightweight Structures, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

An innovative structures concept has been developed that uses space qualified flexible thin film polyimide to produce ultra-lightweight inflation deployed self-rigidizing structural components with very small packaging volume and extremely high buckling/bending strength to accurately deploy and provide precision assembly of modular space systems. This membrane material can be thermally formed to virtually any shape to produce booms, elbows, tees, flanges, and flat or curved panels to support or connect space structure components and facilitate in-space assembly. Tube and panel specimens with various stiffener cross section geometries have been produced that demonstrated precision modular assembly and impressive stiffness. This Phase I effort is proposed to design and fabricate a representative sub-scale structure subassembly comprised of flat or curved structural panels, support tubes/struts, and associated connector/interface components to demonstrate the structural integrity and modularity of the technology and scalability of the manufacturing process. Phase II can produce and demonstrate a full-scale mission applicable inflatable space structure or habitat assembly that can be compactly packaged for launch, pressurized for deployment, and rigidized after deployment/assembly with no internal pressure required to maintain structural stiffness and shape. Emphasis will be placed on deployability, providing for modular assembly, and scalability of the manufacturing technology.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
United Applied Technologies, Inc.	Supporting Organization	Industry	Huntsville, Alabama

Primary U.S. Work Locations
Alabama

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.2 Mission Infrastructure, Sustainability, and Supportability
    - TX07.2.4 Micro-Gravity Construction and Assembly